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(54) Abstract Title
Sport beverages

(57) A carbonated beverage comprises 5 to 20 wt% of fruit juice, carbohydrate in an amount of from 2 to 6g/100 ml and a soluble whey protein hydrolysate in an amount of from 5 to 20g/l. The pH is less than 3.5. The drink is ready to consume directly and has excellent physical and organoleptic properties. The carbohydrate is preferably glucose or dextrose. The beverage may also comprise an acidity regulator, e.g. citric acid or malic acid, a buffering agent, e.g. sodium or potassium citrate, a preservative, e.g. sodium benzoate, and an artificial sweetener, e.g. aspartame.

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"A beverage"

Introduction

The invention relates to a beverage of the type suitable for use by people engaged in physical activities.

WO9711614A describes a pasteurised nutritional liquid supplement beverage with a high calorific value comprising water, from 3 wt% to 5 wt% of a whey protein isolate, a mixture of maltodextrin and sucrose as a preferred source of carbohydrate, vitamins and trace minerals.

EP0117047A describes the addition of a soy or gelatin sourced protein hydrolysate to an acidic fruit-flavoured pasteurised Brik-Paked beverage.

US4478855 describes a pasteurised drink comprising 10 to 85% fruit juice, 90 to 15% milk proteins and, as a sweetener, 2.5 to 20% of hydrolysed lactose.

US4486413 describes a pasteurised conditioning drink consisting of 30 to 90 wt% of a fruit juice, 2 to 20% of a whey concentrate, minerals and vitamins. The drink has a pH of 4.0 to 5.0.

These products are generally of high calorific value and are used as nutritional drinks for infirm people, often under medical supervision. They are not generally suitable for use as ready-to-drink beverages for healthy people, particularly engaged in physical activity. There are a wide range of such beverage products available however, as with nutritional drinks in general, none of the known products is entirely satisfactory in relation to the presentation, organoleptic and/or physical properties of the beverage.

There is therefore a need for an improved beverage which will overcome at least some of these difficulties.

Statements of Invention

According to the invention there is provided a carbonated beverage comprising:-

from 5 to 20 wt% of fruit juice

carbohydrate in an amount of from 2 to 6 g/100ml; and

a soluble whey protein hydrolysate in an amount of from 5 to 20 g/l;

the beverage containing carbon dioxide in an amount of from 4 to 6g/litre and having a pH of less than 3.5.

Preferably for improved organoleptic properties the fruit juice is present in an amount of from 5 to 15 wt%, most preferably approximately 10 wt%.

Ideally the carbohydrate is present in an amount of from 3 to 5g/100ml, preferably approximately 4g/100ml.

In a preferred embodiment of the invention the whey protein hydrolysate is present in amount of from 5 to 15 g/l, ideally approximately 10 g/l. This provides approximately 12% of the acceptable daily intake of protein for an average adult male.

Preferably the juice is of citrus origin and, most preferably, is an orange juice.

In a preferred embodiment of the invention the beverage includes acidity regulator selected from one or more acids of fruit origin.

Ideally the acidity regulator is selected from one or more of malic acid and citric acid.

In a preferred embodiment of the invention the beverage includes a buffering agent which is preferably mineral based and is ideally selected from one or both of sodium citrate and potassium citrate.

Preferably the carbohydrate is of sugar origin, ideally the carbohydrate is selected from one or more of dextrose, glucose or derivatives thereof. Most preferably the carbohydrate is dextrose monohydrate.

In a preferred embodiment of the invention the beverage also includes an artificial sweetener, preferably aspartame. Most preferably the artificial sweetener is present in an amount of from 0.2 to 0.6, preferably about 0.4 g/litre.

The invention provides a carbonated beverage which has exceptional properties in relation to presentation, organoleptic and physical properties. The use of a soluble whey protein hydolysate in an amount of 5 to 20 g/l, preferably 5 to 15 g/l, ideally about 10 g/l provides a significant proportion of the recommended daily intake of protein to the drink. Whey protein hydrolysate is highly refined (i.e. pre-digested) and is therefore more easily digested by the user than, for example, conventional whey protein isolates. However, the addition of a whey protein hydrolysate to a conventional fruit juice beverage does not produce an acceptable product because dissolved solids which precipitate on storage are introduced. The viscosity of the product is also significantly increased and a rather cloying mouthfeel or organoleptic property results. We have solved this problem by adjusting the amount and nature of the carbohydrate used. We have found that a carbohydrate level of 2 to 6 g/100 ml, especially 3 to 5 g/100 ml, ideally about 4 g/100 ml produces a much improved organoleptically and physically acceptable product. The carbohydrate source is most preferably

dextrose monohydrate as it is particularly rapidly assimilated. The sweetening characteristics are preferably enhanced by the addition of an artificial sweetener, especially aspartane in an amount of from 0.2 to 0.6, preferably about 0.4 g/litre. In addition, the use of malic and citric acids as acidity regulators provides taste and pH regulation using mineral sources. Because the beverage is carbonated it is readily acceptable to users and the physical and organoleptic properties of the beverage are optimised.

The invention also provides a method for preparing a beverage of the invention comprising the steps of:-

preparing a mixture of the ingredients in the form of a concentrated syrup;

diluting the syrup with water in a ratio of from 1:2 to 1:6 syrup to water; and

carbonating the beverage thus formed.

Preferably, for ease of processing, the syrup is diluted with water in a ratio of approximately 1:4 syrup to water.

Ideally the beverage is carbonated using carbon dioxide levels of from 5 to 7 g/litre, especially approximately 6 g/litre.

Detailed Description

The invention will be more clearly understood from the following description thereof given by way of example only.

Example

A batch of 1000 litres of syrup was prepared from the following ingredients:

Dextrose Monohydrate	127.20 Kgs
Whey Hydrolysate	40 Kgs
Sodium Benzoate	0.5 Kgs
Citric Acid	8.0 Kgs
Malic Acid	16.0 Kgs
Aspartame	1.6 Kgs
Sodium Citrate	10.0 Kgs
Potassium Citrate	1.44 Kgs
Orange Juice Compound	136 Lts
Water	q.s.

The syrup was mixed with three volumes of water to yield a batch of 4,000 litres. The beverage has a pH of less than 3.5, ideally less than 3. The beverage was carbonated using carbon dioxide levels of 6g ± 1g/litre.

Dextrose monohydrate is used as a carbohydrate source to sweeten the product. Dextrose is particularly rapidly assimilated into the bloodstream. Glucose may be used as an alternative carbohydrate source. The amount of carbohydrate used is sufficient to achieve an amount of approximately 4g/100ml of the beverage.

The whey protein hydrolysate consists of short chained peptides with a low bitterness profile. It is obtained by enzymatic degraduation. One such whey protein hydrolysate is supplied under the name LACPRODAN by M.D. Foods of Denmark.

We have found that the combination of ingredients and especially the combination of orange juice, whey protein hydrolysate and carbohydrate yields a beverage product with excellent organoleptic and physical properties. The addition of carbon dioxide adds especially to the properties of the beverage.

Sodium benzoate is used as a preservative.

Citric and malic acid are food acids which also add considerably to the flavour of the product by virtue of the differing origins i.e. citrus fruit and apples, respectively.

Aspartame is used to provide a high release of sweetening of the beverage.

In addition to buffering the beverage and acidity regulators we have found that sodium citrate and potassium citrate are particularly suitable as they are of mineral origin and provide minerals in an available form.

The invention is not limited to the embodiments hereinbefore described which may be varied in detail.

Claims

1. A carbonated beverage comprising:-

from 5 to 20 wt% of fruit juice

carbohydrate in an amount of from 2 to 6 g/100ml; and

a soluble whey protein hydrolysate in an amount of from 5 to 20g/l;

the drink containing carbon dioxide in an amount of from 4 to 6g/l and having a pH of less than 3.5.

2. A beverage as claimed in claim 1 wherein the fruit juice is present in an amount of from 5 to 15 wt%.

3. A beverage as claimed in claim 1 or 2 wherein the fruit juice is present in an amount of approximately 10 wt%.

4. A beverage as claimed in any preceding claim wherein the carbohydrate is present in an amount of from 3 to 5 g/100ml.

5. A beverage as claimed in any preceding claim wherein the carbohydrate is present in an amount of approximately 4g/100ml.

6. A beverage as claimed in any preceding claim wherein they whey protein hydrolysate is present in an amount of from 5 to 15 g/l.

7. A beverage as claimed in any preceding claim wherein the whey protein hydrolysate is present in an amount of approximately 10 g/l.

8. A beverage as claimed in any preceding claim wherein the juice is a citrus juice.

9. A beverage as claimed in claim 8 wherein the juice is an orange juice.

10. A beverage as claimed in any preceding claim including an acidity regulator selected from one or more acids of fruit origin.

11. A beverage as claimed in claim 10 wherein the acidity regulator is selected from one or more of malic acid and citric acid.

12. A beverage as claimed in any preceding claim including a buffering agent.

13. A beverage as claimed in claim 12 wherein the buffering agent is mineral based.

14. A beverage as claimed in claim 12 or 13 wherein the buffering agent is selected from one or more of sodium citrate and potassium citrate.

15. A beverage as claimed in any preceding claim wherein the carbohydrate is of sugar origin.

16. A beverage as claimed in claim 15 wherein the carbohydrate is selected from one or more of dextrose, glucose or derivatives thereof.

17. A beverage as claimed in claim 16 wherein the carbohydrate is dextrose monohydrate.

18. A beverage as claimed in any preceding claim including an artificial sweetener.

19. A beverage as claimed in claim 18 wherein the sweetener is aspartame.

20. A beverage as claimed in claim 18 or 19 wherein the artificial sweetener is present in an amount of from 0.2 to 0.6 g/litre.

21. A beverage as claimed in claim 20 wherein the artificial sweetener is present in an amount of approximately 0.4 g/litre.

22. A beverage substantially as hereinbefore described with reference to the example.

23. A method for preparing a carbonated beverage as claimed in any preceding claim comprising the steps of:-

preparing a mixture of the ingredients in the form of a concentrated syrup;

diluting the syrup with water in a ratio of from 1:2 to 1:6 syrup to water; and

carbonating the beverage thus formed.

24. A method as claimed in claim 23 wherein the syrup is diluted with water in a ratio of approximately 1:4 syrup to water.

25. A method as claimed in claim 23 or 24 wherein the beverage is carbonated using carbon dioxide levels of from 5 to 7 g/litre.

26. A method as claimed in claim 24 or 25 wherein the beverage is carbonated using carbon dioxide level of approximately 6 g/litre.

The Patent Office

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Claims searched: 1-26 **Date of search:** 23 November 1998

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Int Cl (Ed.6): A23L 2/02, 2/38, 2/52, 2/66

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP 0117047 A1 (GENERAL FOODS) see Examples	1
A	US 4478855 (DAHLEEN) see whole document	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.